

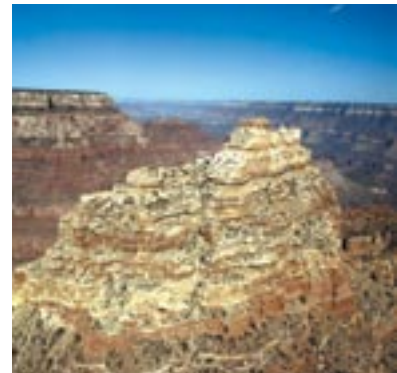
93 Reading the Rocks



In some places, such as the walls of a deep river canyon, hundreds of rock layers are visible, one on top of the other. As rock layers form, each new layer is deposited on top of an already existing layer. When you observe a sequence of rock layers, the top layer, along with any fossils it contains, is younger than any other layer in that sequence, and the bottom layer, along with any fossils it contains, is the oldest layer in that sequence. This is called the **law of superposition**.

A diagram representing a series of rock layers, such as the one on the right, is called a **stratigraphic column**. Stratigraphic columns can be made by looking at the sides of cliffs, or by looking at drill cores. A drill core is a cylindrical piece of rock removed from the Earth by a large drill, similar to the drills that are used to make oil wells. Drill cores can provide samples from many miles beneath the surface of the Earth.

No single location contains a complete set of all the rock layers or fossils that exist on Earth. In order to study a particular fossil organism or find out which organisms lived during which geologic era, paleontologists must compare rocks from different places throughout the world. You will examine and compare four different drill cores, each representing the rock layers found on different fictitious continents.



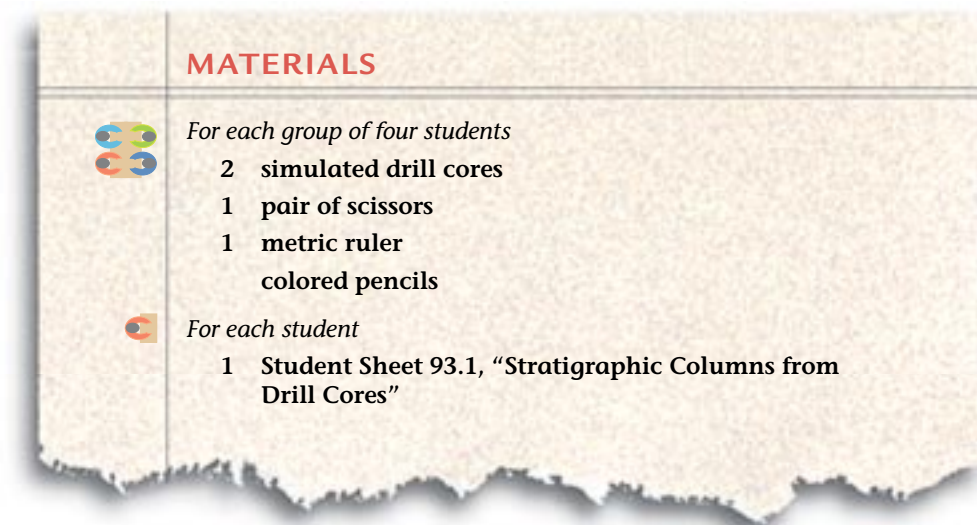
Rock layers in the Grand Canyon



Schematic diagram of fossils in rock layers



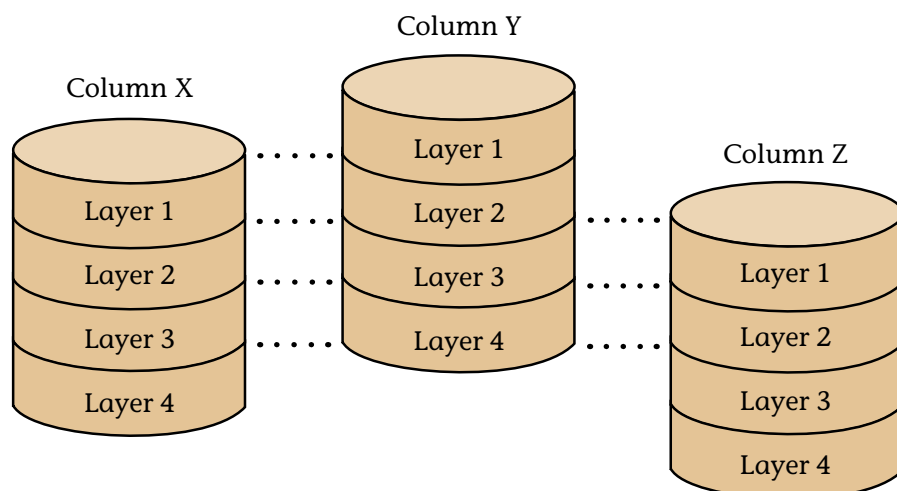
How can you determine which fossils are older, which are younger, and which are likely to be from extinct species?



PROCEDURE

1. Examine your drill core. The top of each drill core is marked with its number.
2. Create a stratigraphic column by sketching in the boundaries of the layers and the fossils found within each layer in the appropriate place on Student Sheet 93.1, "Stratigraphic Columns from Drill Cores." Do this for both drill cores.
3. Based on the evidence within the layers of these drill cores, list the fossils in order from youngest to oldest.
4. When directed by your teacher, exchange your drill cores with a group that has two drill cores with different numbers.
5. Based on the appearance of the rock layers and the fossils found within each layer, match, or correlate, the layers from each core as best you can. Make a chart, similar to the one shown on the opposite page, that shows your correlation of the rock layers from the four different drill cores.
Hint 1: You may want to cut out each column from the Student Sheet so that you can move them around as you try to match up the layers.
Hint 2: Layers don't have to be exactly the same to correlate.
6. Use your correlation chart to list all four of the fossils in order from youngest to oldest.
Hint: If you think a layer found in one drill core is the same as a layer found in another drill core, you can infer that those layers, and the fossils in them, are the same age.

SAMPLE CORRELATION
OF STRATIGRAPHIC
COLUMNS



ANALYSIS



1. Describe some of the difficulties you had trying to match evidence found in one drill core with evidence found in other drill cores. What additional evidence would have helped you make your correlations?



2. Based on evidence from all four drill cores, which, if any, of the organisms represented by the fossils may be from species now extinct? Explain.

3. Which fossil species could have lived at the same time?



4. Using the information below and the list you made in Step 7 of the Procedure, make a timeline that shows the time span when each species is believed to have been alive. Explain how you determined your answer and whether it is based on inference, observation, or a combination of both.

Core	Layer	Geologic Era
4	1	Early Cenozoic
1	2	Early Mesozoic
3	5	Middle Paleozoic
2	5	Early Paleozoic

Hint: Refer to Figure 1 in Activity 89, “Mammoth Mysteries,” for help in designing your timeline.

5. **a.** How does your timeline reflect the law of superposition?
b. How do the timelines you drew in Activity 92, “Time for Change,” reflect the law of superposition?
6. **Reflection:** Propose what might have caused the changes through time shown on your timeline. Explain.